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Solution

Overview

The SY8825 is a chip specifically designed for Bluetooth earbud charging cases. It integrates both charging and discharging modules internally. The charging current is externally adjustable. The discharging module incorporates dual output current-limiting switches, providing independent load presence detection and load insertion detection, while also supporting output current monitoring.

The SY8825's discharge enable control allows the MCU to flexibly manage the chip's discharge function directly via the EN pin. It integrates a single-wire status code output, facilitating easy reporting of chip status to the MCU. The SY8825 is highly suitable for Bluetooth earbud charging case designs, significantly simplifying peripheral circuits and components to provide a straightforward solution for such applications.

The SY8825 is packaged in an ESSOP10 format.

Applications

Bluetooth Earbud Charging Case Portable Lithium Battery Applications

Other low-power power supply applications

Features

- Auto-detect mode standby current: 5μA
- Standby Current in Normal Output Mode: 2.5μA
- Charging current adjustable via external resistor
- Maximum linear charging current: 1A
- Temperature-regulated charging current function: charging current automatically decreases with rising temperature
- C/10 charging termination with automatic recharge
- 4.20V/4.35V charging float voltage with ±1% accuracy
- Integrated charging overvoltage protection
- Synchronous boost output 5.05V, 效率高达93%@0.1A
- Supports load insertion detection
- Supports load current light-load detection, with a detection threshold of 4.5mA
- Features two-stage overcurrent protection for load current
- Supports 5.05V constant output
- Boost output thermal regulation
- Discharge module overcurrent, short-circuit, overvoltage, and overtemperature protection
- Enable control and output state control
- Status code output
- 1-4 LED display with external auto-recognition
- KEY Version: Integrated button functionality. Single click initiates discharge & battery level display. Press and hold button for 3 seconds to stop discharge.

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Typical Application Circuit (I) (Charge: 0.5A; Discharge cutoff: 4.5mA;)

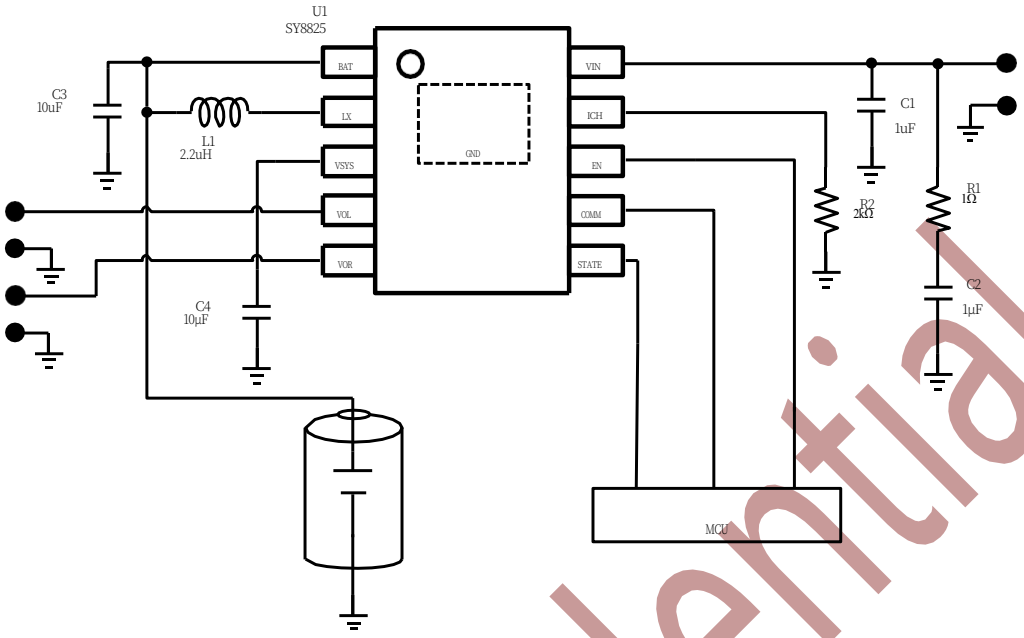

Fig. 1. Typical Application Circuit Diagram

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Typical Application Circuit (II) (Charge: 0.5A; Discharge Cut-off: 4.5mA;)

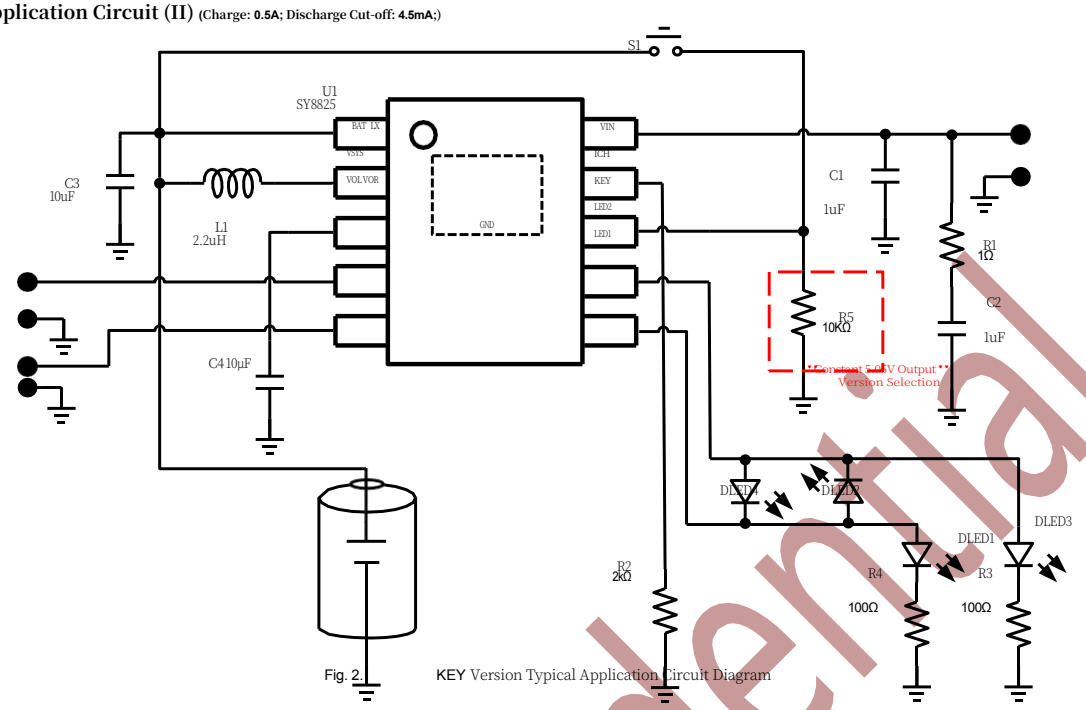

Fig. 2 KEY Version Typical Application Circuit Diagram

Note:

1. When the KEY pin's PIN is grounded via resistor R5, VOL and VOR continuously output 5.05V; without resistor R5, the chip operates in the light-load auto-shutdown output version.
2. The SY8825 LED indicator function can be flexibly configured externally, supporting 1-LED, 2-LED, 3-LED, or 4-LED battery level indicators.

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Pin Functions

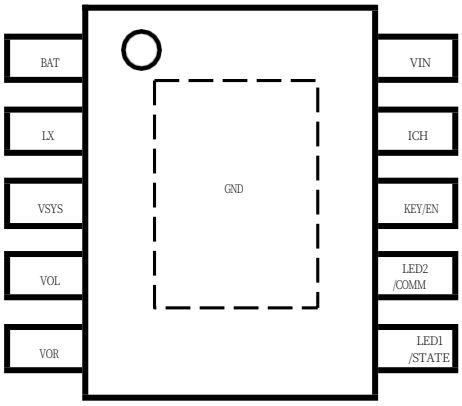

Fig. 3. Chip Pinout Diagram

Name	Port	I/O	Function Description
BAT	1	I	Battery Positive Input
LX	2	O	Switch Output Terminal
VSYS	3	O	BOOST Output Terminal
VOL	4	O	Left Earphone Power
VOR	5	O	Right Ear Headphone Power
LED1 /STATE	6	O	LED1: LED Indicator Output 1 STATE: Chip status serial code output, push-pull output
LED2 /COMM	7	I	LED2: LED indicator output 2 COMM: Chip communication status control port: High in standby mode, enters self-load status detection
KEY/EN	8	I	For KEY version: Connected to the key switch; For EN version: Chip discharge enable control input port
ICH	9	I	Charge current setting port, requires an external resistor connected to GND
VIN	10	I	Adapter Input
GND	PGND	-	Chip GND

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Ordering Information

SY8825-□□□□□-□

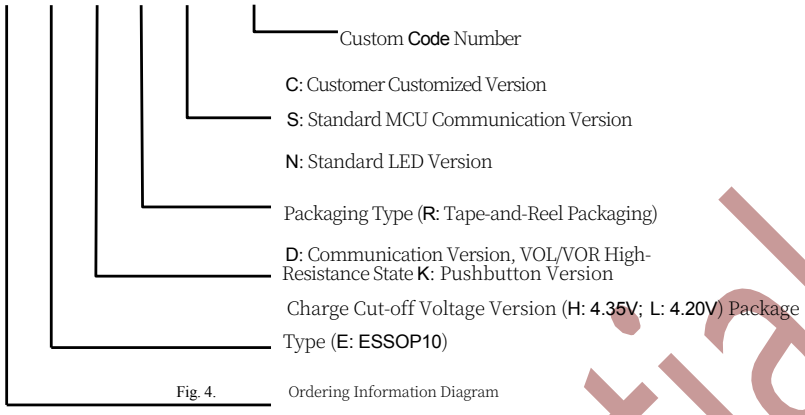
Custom Code Number
C: Customer Customized Version
S: Standard MCU Communication Version
N: Standard LED Version
Packaging Type (R: Tape-and-Reel Packaging)
D: Communication Version, VOL/VOR High-Resistance State K: Pushbutton Version
Charge Cut-off Voltage Version (H: 4.35V; L: 4.20V) Package Type (E: ESSOP10)

Fig. 4. Ordering Information Diagram

EN Version				
Ordering Model	Package Type	Charge Cut-off Voltage (V)	Custom Requirements	Packaging Quantity (Pcs)
SY8825-ELDRS	ESSOP10	4.20	Standard Version	4000
SY8825-EHDRS		4.35	Standard Version	4000
SY8825-ELDRC-V48		4.20	VSYS Voltage: 4.8V	4000
SY8825-EHDRC-V48		4.35	VSYS Voltage: 4.8V	4000

KEY Version					
Ordering Model	Package Type	Charge Cut-off Voltage (V)	KEY Function Description	Indicator Description	Packaging Quantity (Pcs)
SY8825-ELKRN	ESSOP10	4.20	When KEY is configured as "Auto-Detect" version: 1. Click KEY to boost voltage to 5.05V and check battery level; 2. Long press KEY to turn off VOL/VOR's 5.05V, and VOL/VOR is weakly pulled up to VBAT; When KEY is configured as "Constant 5.05V Output" version: 1. Click/long press KEY to check battery level;	Standard lamp version: 1. Supports 1 to 4 lamp displays 2. Selects 2-lamp mode when 2 lamps are chosen Standard LED Display	4000
SY8825-EHKRN		4.35			

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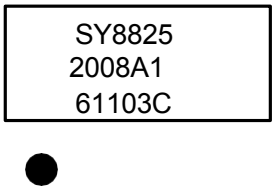
Silkscreen Instructions



1. First line: 6-character product model;
2. The first 4 digits of the 6-digit characters in the second line represent the calendar week number, and the last 2 digits represent the production code;
3. The third row of 6-digit characters indicates the production batch number;

Function Block Diagram

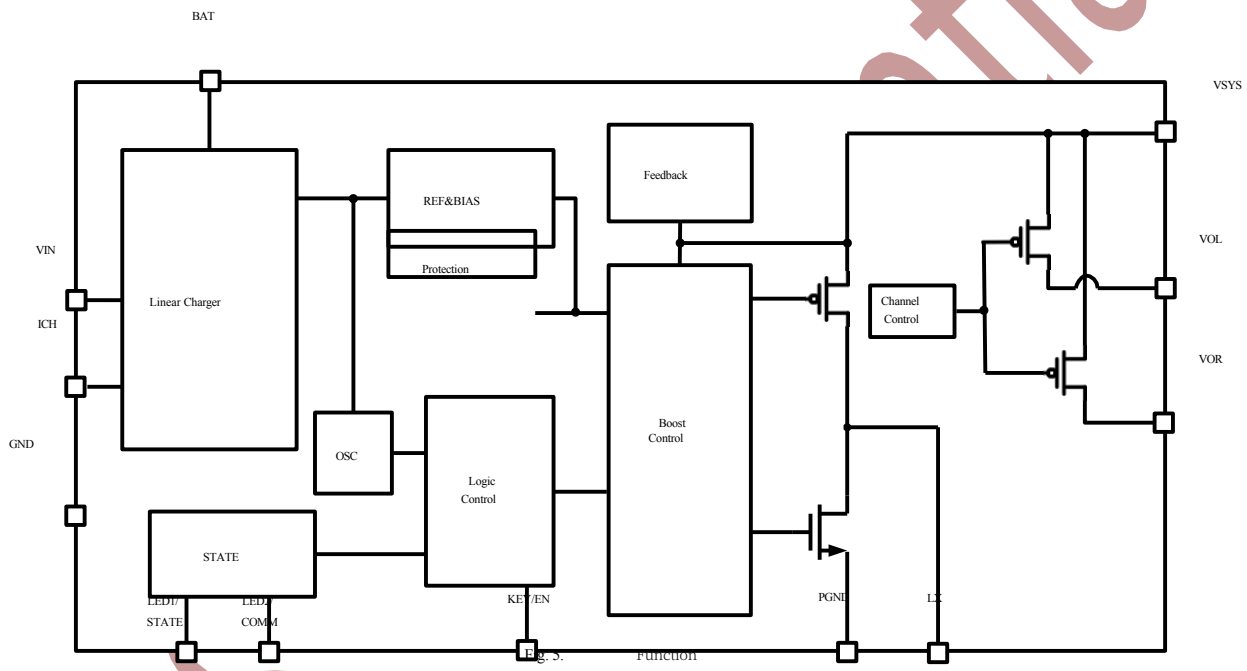


Fig. 5. Function Block Diagram

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Electrical Parameters

Limit Parameters(1)

Parameters	Minimum	Maximum	Unit
VIN Pin Withstand Voltage	-0.3	+20	V
Other Pins Withstand Voltage	-0.3	+6	V
Storage ambient temperature	-65	150	℃
Operating ambient temperature	-20	85	℃
Operating junction temperature range	-40	150	℃
HBM (Human Body Model)	2K	-	V
MM (Machine Discharge Model)	200	-	V
CDM (Device Discharge Model)	1000	-	V

Recommended Operating Conditions 2

Input Voltage ---------- 2.9V to 5.5V

Operating Junction Temperature Range---------- -40°C to 125°C

Ambient Temperature Range ---------- -20°C to 85°C

Note:

(1) Maximum limit values indicate that exceeding these ranges may damage the chip. (2) Recommended operating conditions indicate that normal operation cannot be guaranteed beyond these parameters.

Typical Performance Parameters

(Unless otherwise specified, VIN = 5V, VBAT = 3.7V, Ta = 25°C, L1 = 2.2uH)

Symbol	Parameters	Test Conditions	Minimum	Typical Value	Maximum	Unit
ISTDB	Standby Current (EN=0 or Load Auto-Detection Version)		-	5	-	μA
	No-Load Current (EN=1 or 5.05V Output) Version)		-	2.5	-	μA
IEN	EN pin pull-down current		-	2	-	uA
VENH	EN High threshold		-	2	-	V
VENL	EN Low-threshold threshold		-	0.5	-	V
IKEY	KEY pull-down current		-	60	-	μA
TKEY_S	Time to press the KEY key		100	-	-	mS
TKEY_L	Long press time for KEY key		1.5	-	-	S
Tcode	Status Code Unit Time		0.4	0.5	0.6	mS
OTP	Over-Temperature Protection		-	150	-	℃
THYS	Over-temperature protection hysteresis		-	20	-	℃
Charging Section						
VIN	Input Voltage Range		4.4	5	6	V
VINOVP	Input Overvoltage Protection		-	6	-	V

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VUV	Input Undervoltage Protection		-	4.4	-	V
VDPPM	VIN Adaptive Voltage Point		-	4.6	-	V
VFLOAT	Float Charge Voltage, 4.20V Version	0°C ≤ TA ≤ 85°C	4.158	4.2	4.242	V
	Float charge voltage, 4.35V version		4.306	4.350	4.393	V
ΔVRECHRG	Recharge Hysteresis Voltage	VFLOAT-VRECHRG	150	200	250	mV
ICC	Constant Current Charge Current	RICH=2K	-	0.5	-	A
ITRIKL	Trickle Charge Current	RICH=2K	-	50	-	mA
VTRIKL	Trickle Charge Threshold Voltage		-	2.8	-	V
VTRHYS	Trickle Charge Hysteresis Voltage		-	200	-	mV
ITERM	Termination Current Threshold			0.1*ICC		mA
VBATOVP	Battery Overvoltage Protection Voltage	4.20V Version	-	4.5	-	V
		4.35V Version	-	4.65	-	V
Discharge Section						
VBAT	Battery Operating Voltage		2.7	-	4.35	V
VUV_BAT	Battery Undervoltage Output Disable Threshold	Light Load Auto Shutdown Version	-	3.0	-	V
	Battery Undervoltage Output Disable Threshold	EN=1 or constant 5.05V output version	-	2.7	-	V
VHYS_BAT	Battery Undervoltage Lockout Hysteresis	VBAT rising, no VIN	-	0.3	-	V
		VBAT rising, VIN present	-	0.6	-	V
VSYS	Rated Output Voltage	VBAT=3.7V	4.95	5.05	5.15	V
RPMOS	High-side PMOS on-resistance		-	300	-	mΩ
RNMOS	Low-side NMOS on-resistance		-	200	-	mΩ
IPNMOS	Low-side NMOS Peak Current Limiting		-	1	-	A
Isys	Output Current	VBAT=3.0~4.2V	-	0.5	-	A
η	Conversion Efficiency	VBAT=4.2V VSYS=5.05V Isys=0.1A	-	93	-	%
VRIPPLE	Output Ripple Voltage	VSYS=5.05V& Isys=0.1A	-	100	-	mV
VSHORT	Short-circuit protection voltage		-	4.3	-	V
Vsys_OVP	Output Overvoltage Protection		-	5.5	-	V
TSS	Soft Start Time		-	2	-	ms
Output Current Limiting Switch						
Ilimt	Single-channel output current switch limiting current	VBAT=3.0~4.2V	-	160	-	mA
IEND	Light Load Current Detection		-	4.5	-	mA
Rvol, Rvor	Current-Limiting Switch Impedance	VSYS=5.05V	-	550	-	mΩ
LED display						
VLB	Low Voltage Alarm Voltage		-	3.3	-	V
IED	LED Drive Current		-	2	-	mA

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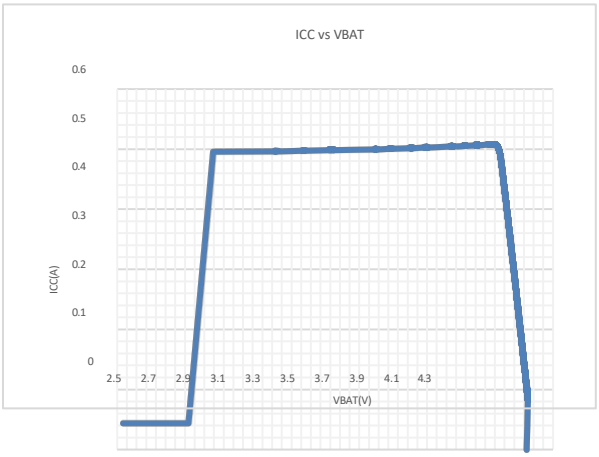
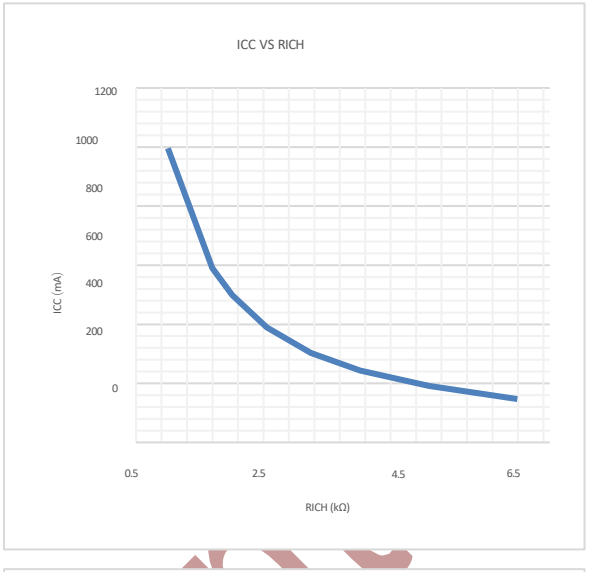
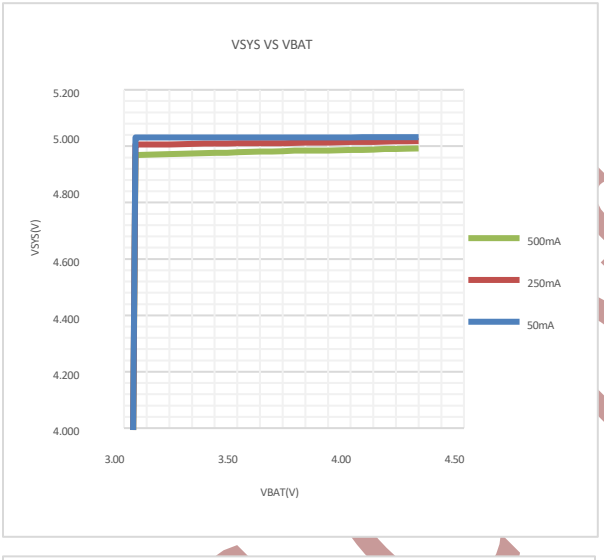
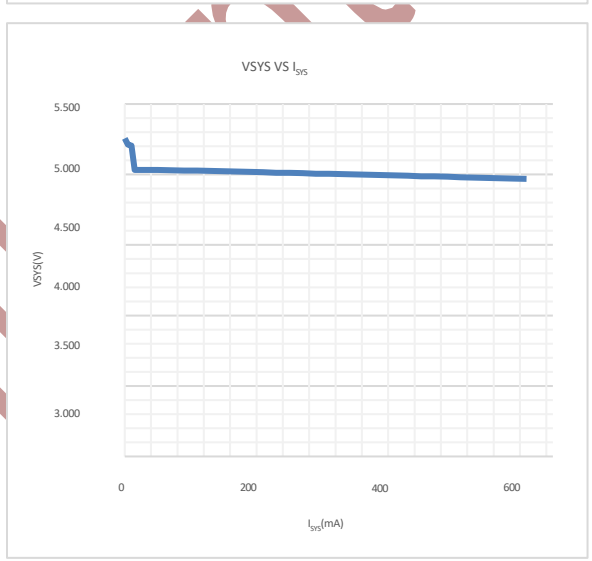
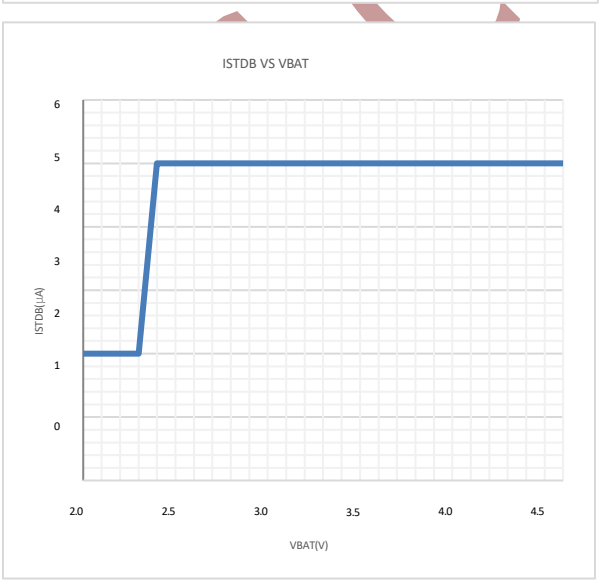
Typical Characteristics

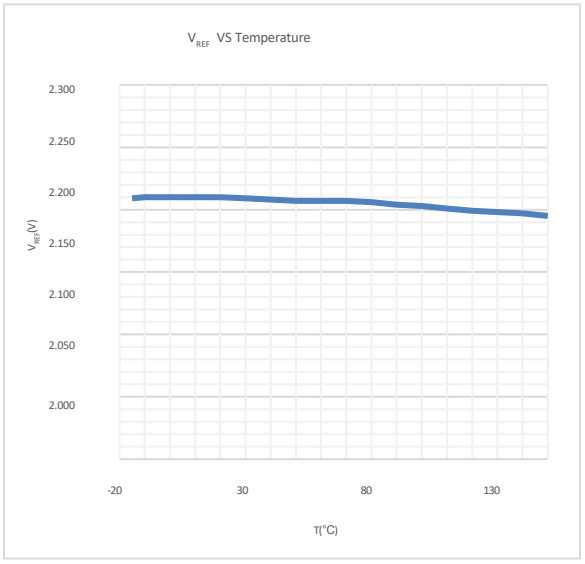




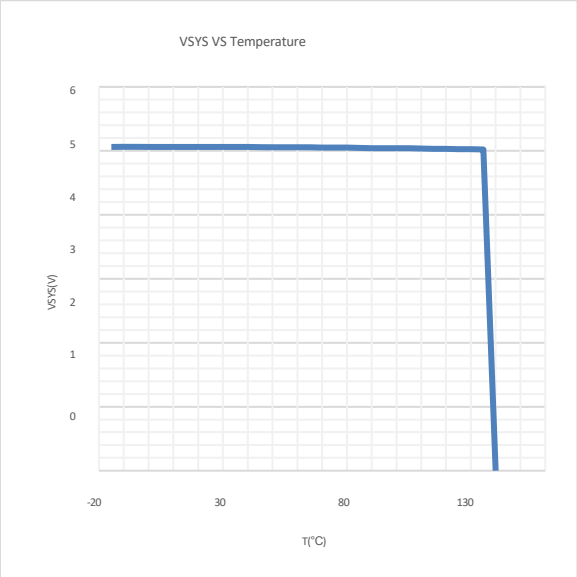


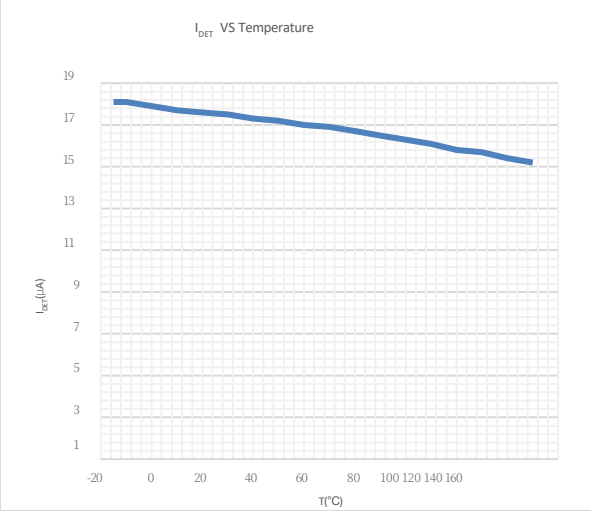


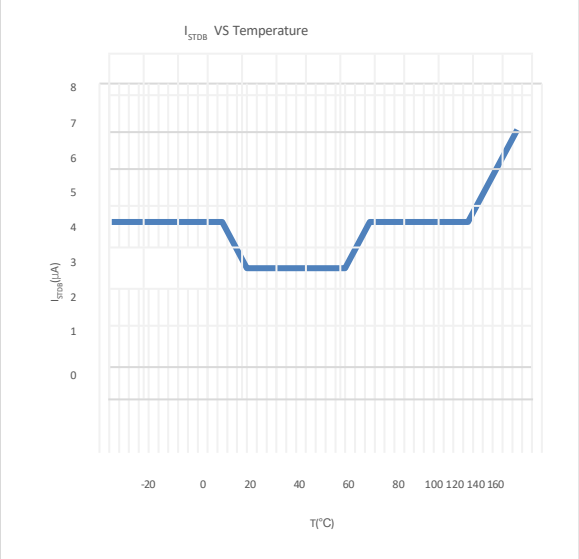


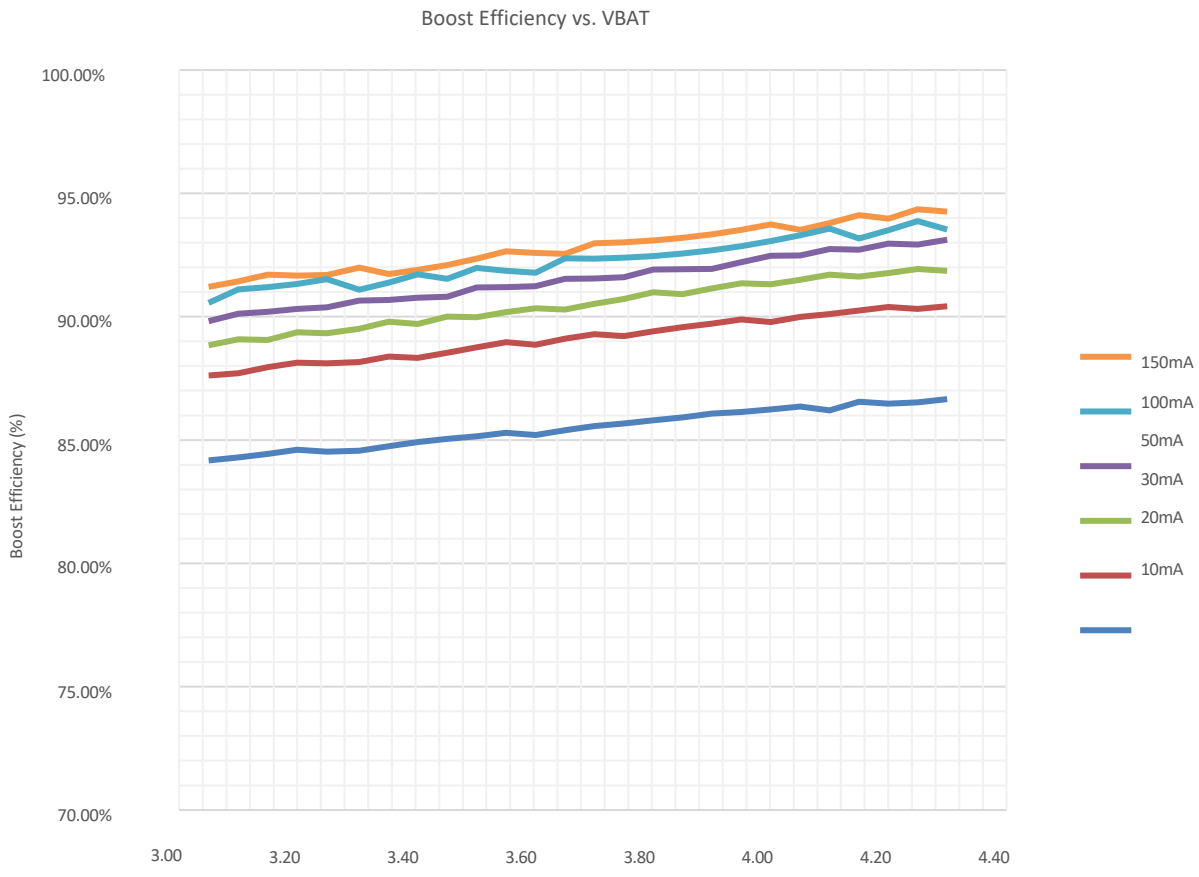


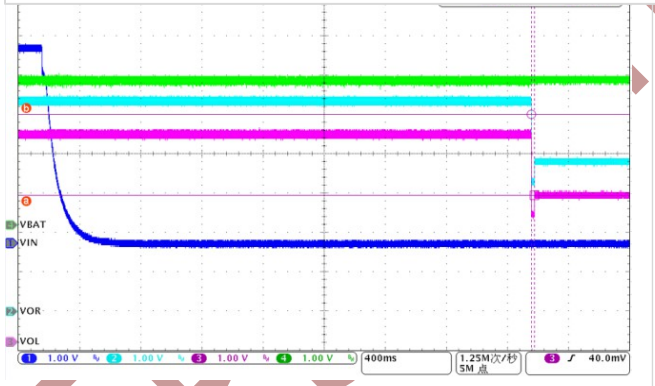
ICC VS Temperature
ICC(mA)
300
250
200
150
100
50
0
-20
0
20
40
60
80
100
120
140
T(°C)


VSYS VS Temperature
VSYS(V)
6
5
4
3
2
1
0
-20
30
80
130
T(°C)

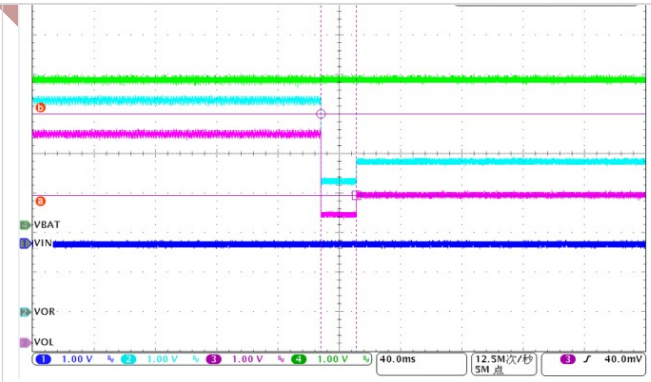

I_DET VS Temperature
I_DET(uA)
19
17
15
13
11
9
7
5
3
1
-20
0
20
40
60
80
100 120 140 160
T(°C)


I_STDB VS Temperature
I_STDB(uA)
8
7
6
5
4
3
2
1
0
-20
0
20
40
60
80
100 120 140 160
T(°C)

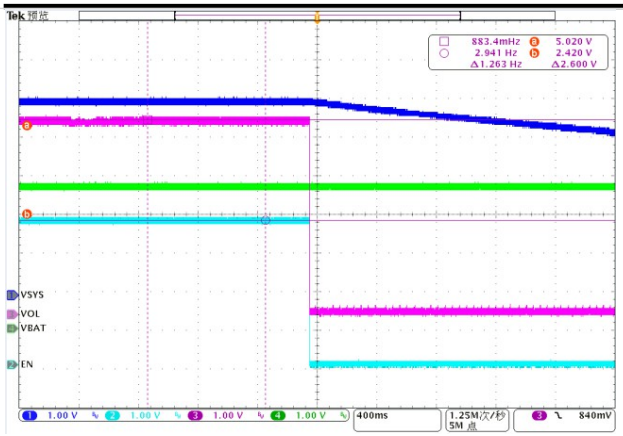




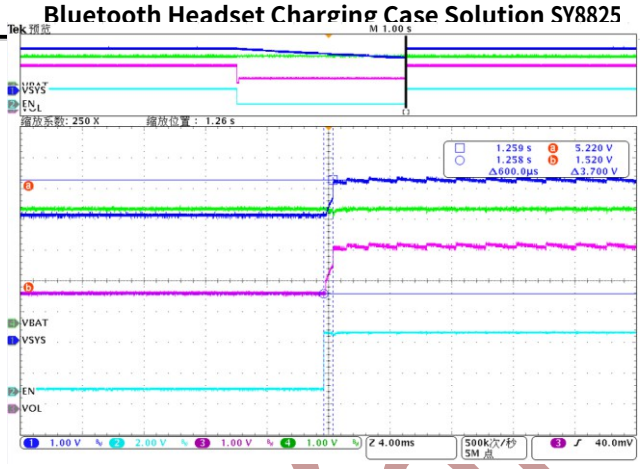
Light Load Auto-Shutdown Waveform



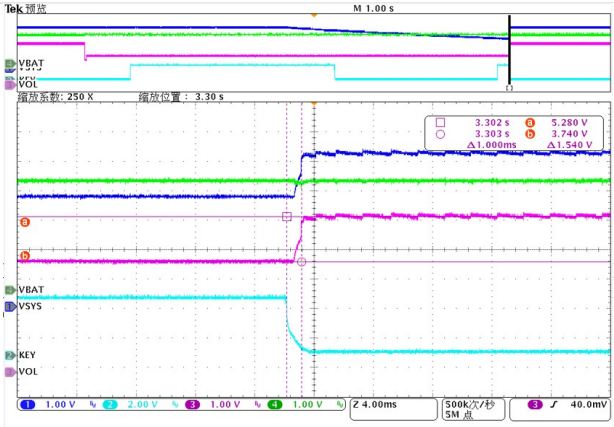
Light Load Auto Shutdown Waveform



EN=0, Disabled BOOST Waveform



EN=1, BOOST Waveform Enabled



Press KEY to activate BOOST waveform

Long press KEY to disable BOOST waveform

TPS Confi

Function Description:

Charging Module

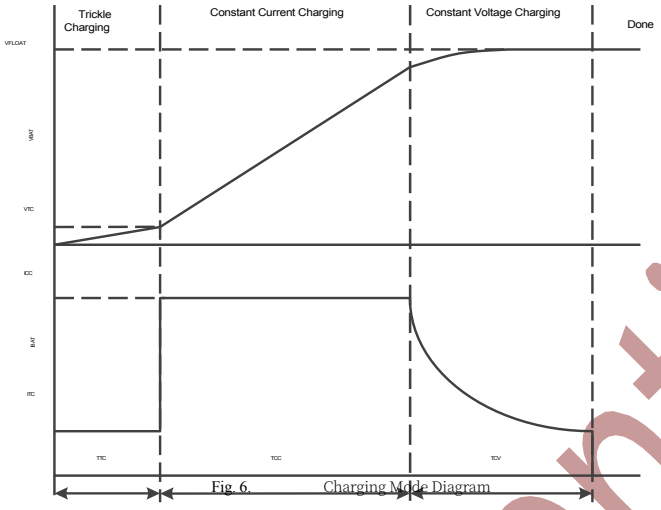


Fig. 6. Charging Mode Diagram

The SY8825 integrates a complete linear charging module internally, utilizing the chip's internal power transistor to perform trickle, constant-current, and constant-voltage charging on the battery. The charging current can be adjusted via an external resistor, with a maximum charging current of 1A.In constant-current mode, the chip employs linear charging with a charging current of I_{CC} ( ). In trickle mode, the charging current is $0.1*I_{CC}$ ( ). In constant-voltage mode, the charging current gradually decreases. When the charging current falls below the charge cutoff current, the charging cycle ends. For the 4.2V float voltage version, the system automatically initiates a new charging cycle when the battery voltage drops below 4V again.

The charging current calculation formula for the SY8825 is as follows:

$$I_{CC} = \frac{1000}{R_{ICH}(k\Omega)} \text{ (mA)}$$, where 150mA ≤ ICC ≤ 1A. Setting ICC outside this range is prohibited.

The charging section incorporates the following protections and features: adaptive adapter functionality, over-temperature current limiting, ICH short-circuit/open-circuit protection, and input overvoltage/undervoltage protection.

The internal power management circuit automatically reduces the charging current when the chip junction temperature exceeds 110℃, and reduces the current to zero when the temperature exceeds 150°C. This feature allows users to maximize utilization of the chip's power handling capability without risking damage to the chip or external components due to overheating.

When the adapter's output current falls below the set charging current, the chip automatically adjusts based on the adapter's maximum output current. It reduces the charging current to match the adapter's capability, preventing damage caused by over-discharge.

Discharge Module Boost Output

The SY8825 provides a single synchronous boost output with integrated power MOS, delivering 5.05V/0.5A output at up to 93% efficiency. It employs hysteretic current-mode control, maintaining a constant inductor current ripple around 600mA while adjusting the DC value of the inductor current based on load conditions to ensure stable output voltage.Since input voltage, output voltage, and inductance all influence the rise/fall slope of the inductor current, the switching frequency of the SY8825's boost output is not fixed but depends on the chip's operating state. When the required average input current falls below the average inductor current defined by the constant hysteresis current window, the SY8825 enters discontinuous mode to maintain high efficiency during light load operation.

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constant hysteresis current window, the SY8825 enters discontinuous mode to maintain high efficiency during light load operation. Figure 7 illustrates the hysteresis current operating state.

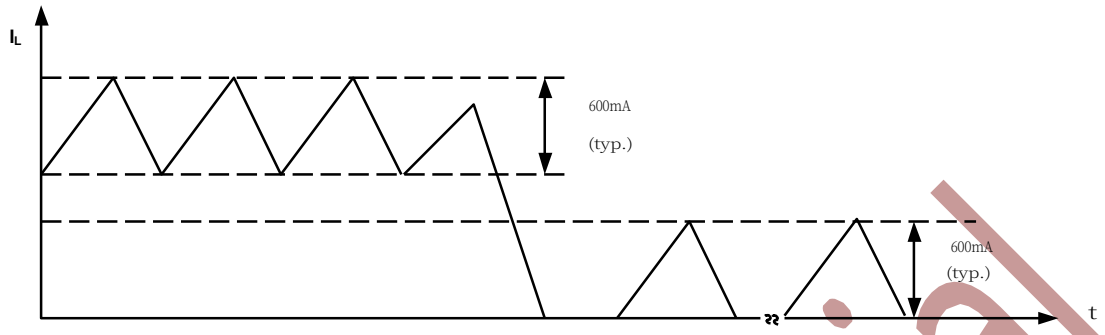

Fig. 7. Hysteresis Current Operating State

If the load current continues to decrease, the SY8825 enters Burst mode.In Burst mode, the chip operates through several switching cycles to raise the output voltage to a preset voltage point before entering Sleep state. In Sleep state, the chip ceases switching and remains in an ultra-low power state until the output voltage drops to another preset voltage point, at which point the power switch reopens. When the load current exceeds the maximum current Burst mode can provide, the chip exits Burst mode. Figure 8 shows the SY8825 Burst mode operating state diagram.

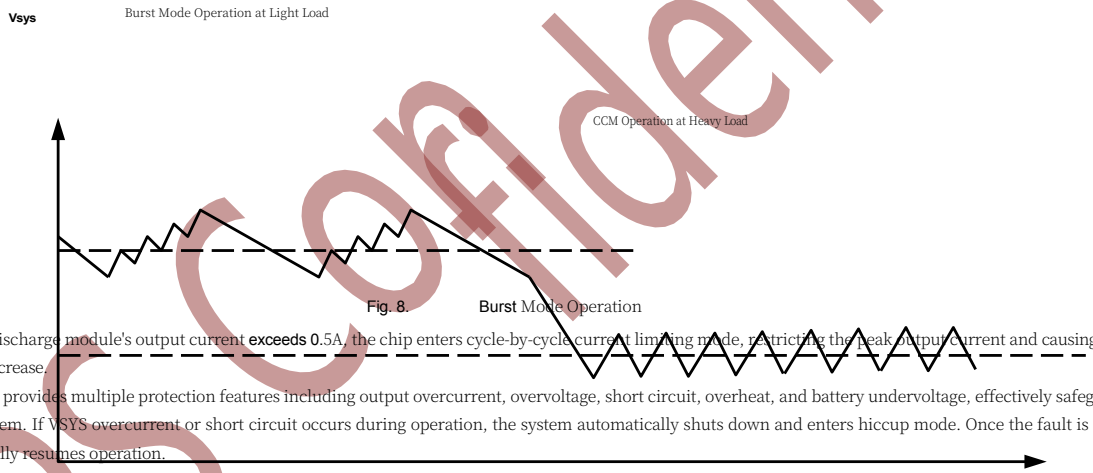

Fig. 8. Burst Mode Operation

When the discharge module's output current exceeds 0.5A, the chip enters cycle-by-cycle current limiting mode, restricting the peak output current and causing the output voltage to decrease.

The SY8825 provides multiple protection features including output overcurrent, overvoltage, short circuit, overheat, and battery undervoltage, effectively safeguarding the battery and system. If VSYS overcurrent or short circuit occurs during operation, the system automatically shuts down and enters hiccup mode. Once the fault is cleared, the chip automatically resumes operation.

During discharge, if the battery voltage drops below the UVLO threshold (2.7V), the system automatically shuts down and locks into an under-voltage lockout state, disabling the discharge module. Unlocking requires either applying VIN, connecting a load, or re-enabling the EN pin.

Output Current Limiting Switch

The SY8825 integrates dual output current-limiting switches from VSYS to VOL and VOR, providing load insertion detection and load current sensing at the VOL and VOR terminals.

Upon detecting load insertion, the SY8825 reports a status code to the MCU, which then enables discharge functionality by pulling the EN pin high.

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When the port currents of both VOL and VOR fall below the set light-load current threshold (4.5mA), the chip enters light-load mode. If the current on either the VOL or VOR port exceeds the set threshold (10mA), the chip enters heavy-load mode. Upon triggering either light-load or heavy-load conditions, the chip's STATE pin immediately sends a status code to the MCU.

If overcurrent or short circuit occurs on either the VOL or VOR output port, both VOL and VOR will shut down simultaneously, entering hiccup mode while reporting the status code to the MCU. After the abnormality is resolved, the chip automatically resumes output.

KEY Function

The KEY pin must be connected to a pushbutton.

When VIN is not connected, a single press of the KEY button displays the battery level and activates the discharge module. For versions with light-load shutdown, when the battery voltage is between 2.7V and 3.0V, pressing the KEY button activates the discharge module for 4 seconds, with the LED flashing for 4 seconds to indicate low battery. Pressing the KEY button also unlocks the BAT undervoltage lockout. When BAT voltage drops below 2.7V, the undervoltage lockout circuit engages, disabling the discharge module. Unlocking requires either reinserting VIN or pressing the KEY button after BAT voltage recovers above 3.2V.

When VIN is not connected, a 3-second press of the KEY button will force the boost output module to shut down. Pressing the KEY button again or reconnecting the load will reactivate it.

EN Function

SY8825 detects a low EN level to disable boost discharge functionality, deactivates the VOL/VOR output channel, and enters automatic load recognition mode.

When EN is high, VOL/VOR is enabled and boost discharge function is activated.

The SY8825 allows the MCU to switch between different output states of VOL/VOR by combining inputs on the COMM and EN pins, enabling chopper communication between the warehouse and headphones. The COMM pin is internally pulled up by default. The input state combinations are shown in the table below.

Table 1. Truth Table for EN and COMM State Combinations

EN	COMM	Function
0	0	VOL/VOR Output High-Impedance State
0	1	VOL/VOR automatically pulled up to VBAT (standby state)
1	0	VOL/VOR Output 0V
1	1	VOL/VOR Output 5.05V

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LED Indicator Display

The LED display functions include charging level indication, discharging level indication, and headphone insertion alert. The SY8825 supports 1 to 4 LEDs, automatically recognizing the display mode based on the pin configuration.

The SY8825's LED power source selects either VIN or VBAT (whichever is higher). Therefore, when VBAT = 0V, inserting VIN will still illuminate the LED.

Regarding the "flash once" indication for headphone insertion described in the following display modes:

1. During charging: First off for 0.5 seconds, then display current status;

2. During discharge: Turns off for 0.5 seconds, then stays on for 4 seconds before turning off;

1-LED Display Mode

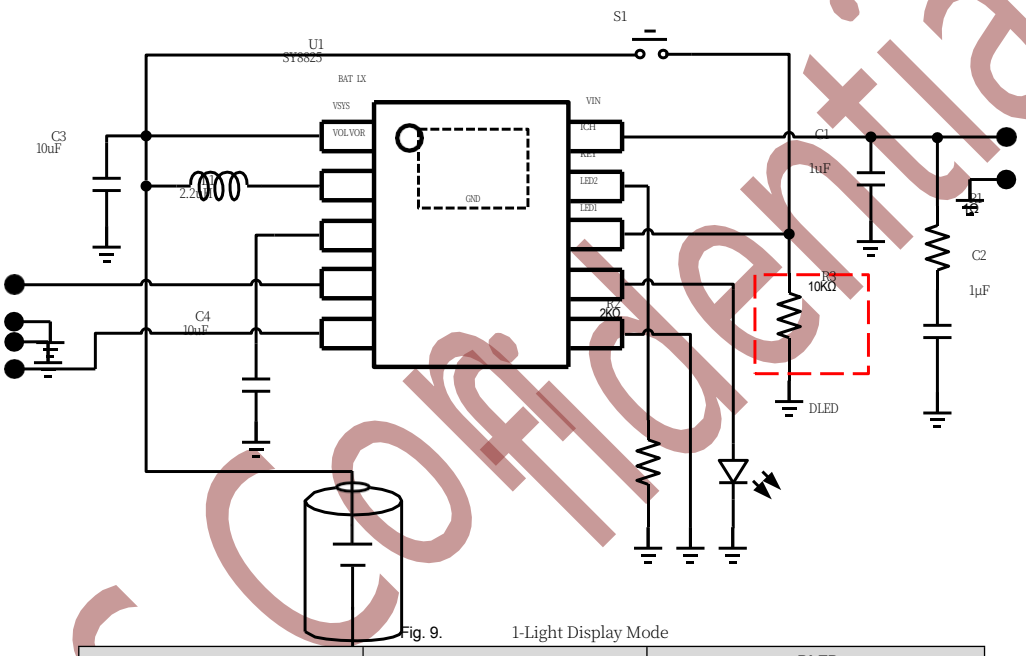

Fig. 9. 1-Light Display Mode

Mode	Status	DLED
Charging	Fully Charged	Steady On
	Charging Status	1Hz flashing
Discharging	Normal discharge state	On for 4 seconds then off
	Low battery status	1Hz flashing for 4 seconds then turns off
Headphones inserted	-	Flash once

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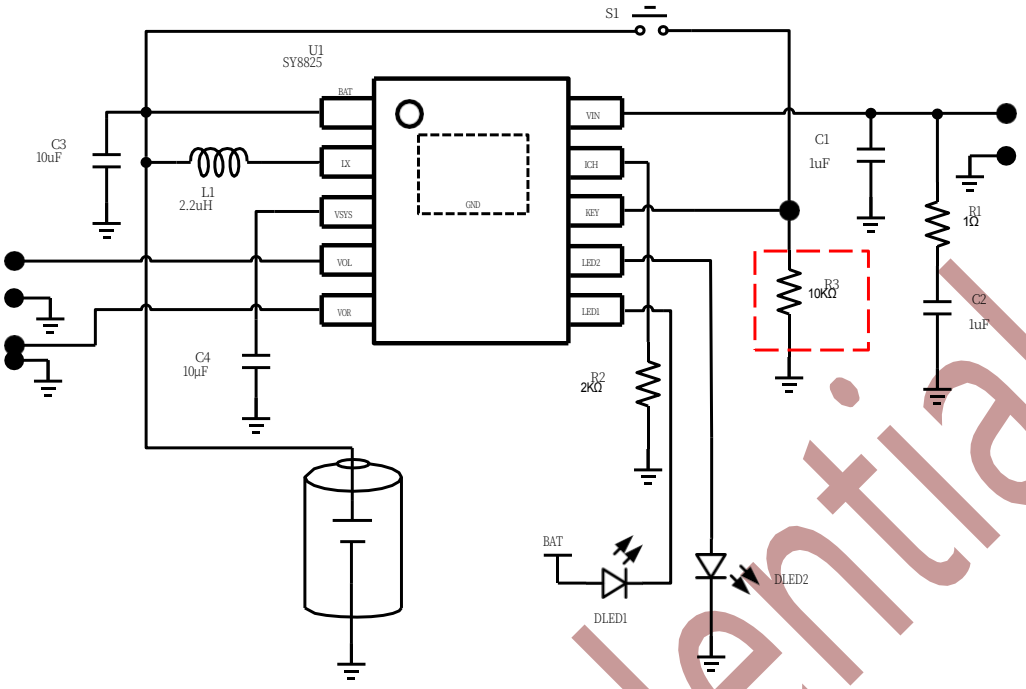
2-light display mode (one light for charging, one for discharging)



Mode	Status	DLED1	DLED2
Charging	Discharging) Fully Charged	Off	Steady
	Charging	Off	1Hz flashing
Discharging	Normal discharge state	On for 4 seconds then off	Off
	Low battery status	1Hz flashing for 4 seconds then turns off	Off
Headphones inserted	-	Flash once	

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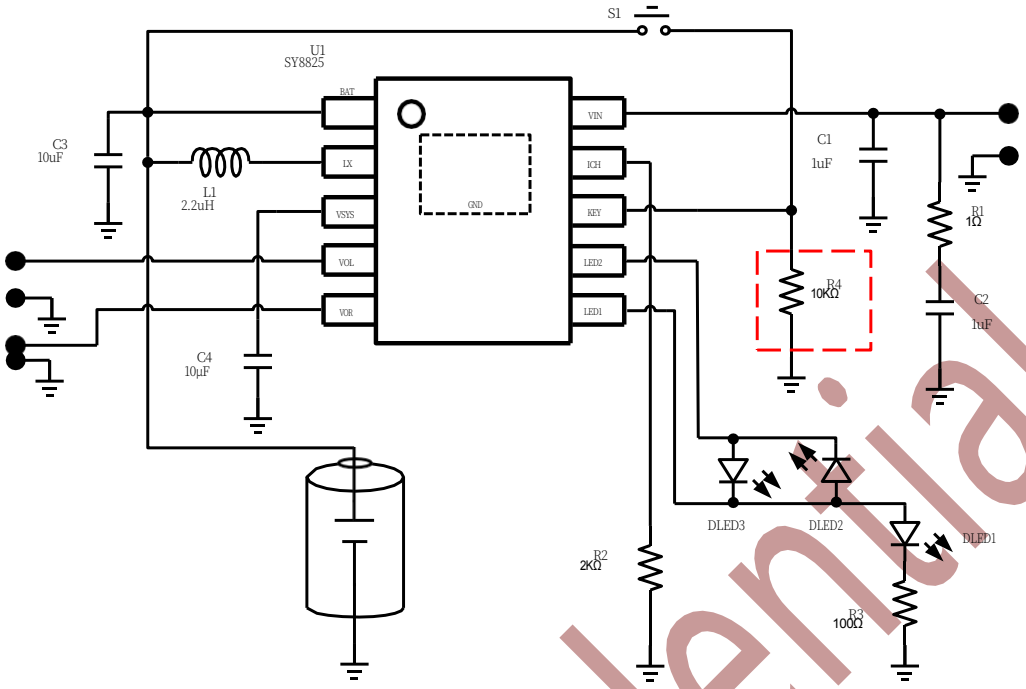
3-light display mode



Mode	Battery Level	DLED1	DLED2	DLED3
Charging	Fully Charged	Steady On	Steady	Steady
	66%-100%	Steady	Constant On	1Hz Flicker
	33%-66%	Constant On	1Hz Flicker	Off
	0%-33%	1Hz Flicker	Off	Off
Discharge	66%-100%	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off
	33%-66%	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off	Turn off
	5%-33%	Light up for 4 seconds then turn off	Off	Off
	0%-5%	1Hz flash for 4 seconds then turn off	Off	Off
Headphones inserted	-	Flash once		

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4-light display mode

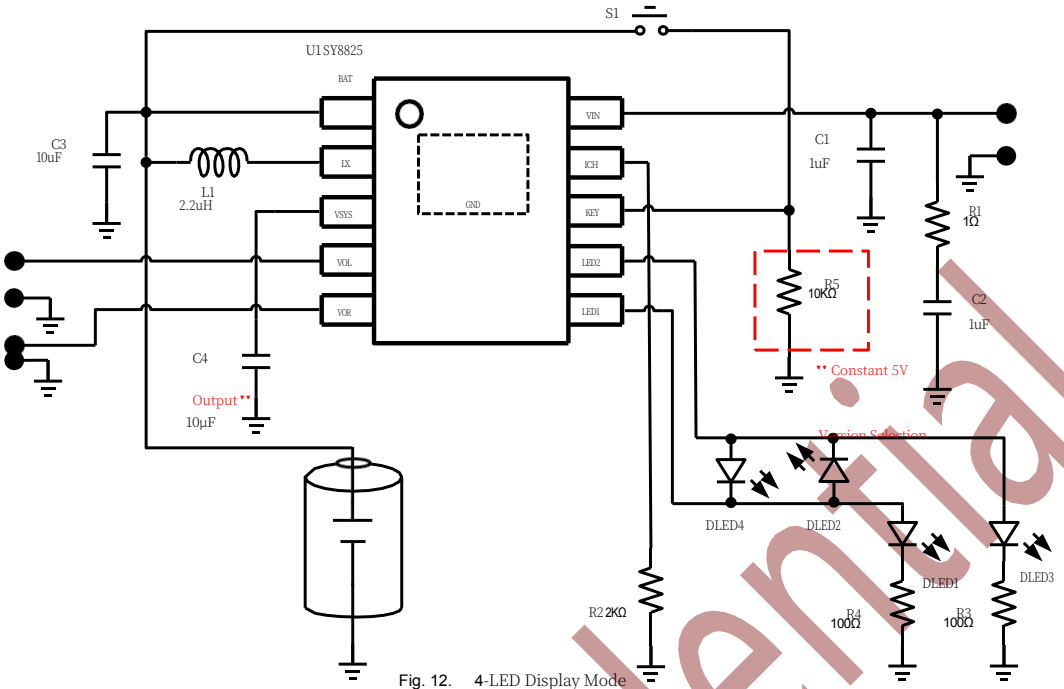

Fig. 12. 4-LED Display Mode

Mode	Battery Level	DLED1	DLED2	DLED3	DLED4
Charging	Fully Charged	Steady On	Steady	Steady	Steady
	75%-100%	Long Bright	Long-lasting	Constant On	1Hz Flicker
	50%-75%	Steady	Steady	1Hz Flashing	Off
	25%-50%	Steady	1Hz Flashing	Off	Off
	0%-25%	1Hz Flicker	Off	Off	Off
Discharge	75%-100%	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off
	50%-75%	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off	Turn off
	25%-50%	Light up for 4 seconds then turn off	Light up for 4 seconds then turn off	Off	Off
	5%-25%	Light up for 4 seconds then turn off	Off	Off	Off
	0%-5%	1Hz flashing for 4 seconds before turning off	Off	Off	Off
Headphones inserted	-	Flash 1 time			

LED indicates battery level

Table 1. 4-LED/3-LED Switching Voltage Points

LED Configuration	Battery Charge Level	4.20V Version		4.35V Version	
		Charge (V)	Discharge (V)	Charge (V)	Discharge (V)
4-Light Configuration	75%	4.10	3.90	4.25	4.04
	50%	4.00	3.75	4.14	3.88
	25%	3.80	3.60	3.94	3.73
3-light configuration	66%	4.00	3.75	4.14	3.88
	33%	3.80	3.60	3.94	3.73

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Status Code Output

The SY8825 reports the chip's operational status via the STATE pin. For example, when the chip detects a load connection, it can transmit a serial code to the MCU which then decide when to enable EN. The status code consists of 24 bits, with each bit representing a specific state as shown in the table below.

Table 2. Status Code Definitions

Bit	Signal	Flag Meaning	
		0	1
0	bat_uvlo_ok	VBAT Undervoltage	VBAT OK
1	vinok	VIN Voltage Abnormal	VIN voltage normal
2	en_cg	Chip is in non-charging state	Chip in charging state
3	cg_vl	During charging: BAT terminal voltage is less than 4.05V	During charging: BAT terminal voltage greater than 4.05V
4	cg_ed	VIN charging not terminated	VIN charging cutoff
5	en_discg	VSYS discharge not enabled	VSYS Discharge Enable
6	en_vo	VOL/VOR Discharge Not Enabled	VOL/VOR Discharge Enabled
7	ICH_OS	ICH pin normal	ICH pin shorted
8	loadin_l	No load has ever been connected to the left ear	Left ear has previously had a load connected
9	loadin_r	Right ear has never had a load connected	Right ear has previously had a load connected
10	loadon_l	No load present on left ear	Left ear load present status
11	loadon_r	No load present on the right ear	Right ear load present state
12	vol_iload	Left ear load less than 4.5mA	Left ear load greater than 10mA
13	vor_iload	Right ear load less than 4.5mA	Right ear load greater than 10mA
14	data1	VBAT discharge low voltage alarm	VBAT discharge level normal
15	st_abnormal	NTC and VSYS both normal	NTC abnormal or VSYS short circuit
16	ntc_abnormal	Default value, meaningless	Default value, meaningless
17	vo_abnormal	VOL/VOR No Overcurrent	VOL/VOR Overcurrent
21:18	st_Battery[3:0]	VBAT Battery Level Information (Refer to the table below)	
23:22	00	Reserved Bits	

VBAT Battery Level Information Table (4.2V Version)				
Bit21	Bit20	Bit19	Bit18	Meaning
0	0	0	0	VBAT < 3.10
0	0	0	1	3.10 ≤ VBAT < 3.20
0	0	1	0	3.20 ≤ VBAT < 3.30
0	0	1	1	3.30 ≤ VBAT < 3.40
0	1	0	0	3.40 ≤ VBAT < 3.50
0	1	0	1	3.50 ≤ VBAT < 3.60
0	1	1	0	3.60 ≤ VBAT < 3.65
0	1	1	1	3.65 ≤ VBAT < 3.70
1	0	0	0	3.70 ≤ VBAT < 3.75
1	0	0	1	3.75 ≤ VBAT < 3.80
1	0	1	0	3.80 ≤ VBAT < 3.85
1	0	1	1	3.85 ≤ VBAT < 3.90

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1	1	0	0	3.90 ≤ VBAT < 4.00
1	1	0	1	4.00 ≤ VBAT < 4.10
1	1	1	0	4.10 ≤ VBAT < 4.20
1	1	1	1	4.20 ≤ VBAT

VBAT Battery Information Table (4.35V Version)				
Bit21	Bit20	Bit19	Bit18	Meaning
0	0	0	0	VBAT < 3.21
0	0	0	1	3.21 ≤ VBAT < 3.31
0	0	1	0	3.31 ≤ VBAT < 3.42
0	0	1	1	3.42 ≤ VBAT < 3.52
0	1	0	0	3.52 ≤ VBAT < 3.63
0	1	0	1	3.63 ≤ VBAT < 3.73
0	1	1	0	3.73 ≤ VBAT < 3.78
0	1	1	1	3.78 ≤ VBAT < 3.83
1	0	0	0	3.83 ≤ VBAT < 3.88
1	0	0	1	3.88 ≤ VBAT < 3.94
1	0	1	0	3.94 ≤ VBAT < 3.99
1	0	1	1	3.99 ≤ VBAT < 4.04
1	1	0	0	4.04 ≤ VBAT < 4.14
1	1	0	1	4.14 ≤ VBAT < 4.25
1	1	1	0	4.25 ≤ VBAT < 4.35
1	1	1	1	4.35 ≤ VBAT

The status code of SY8825 consists of a start bit followed by 24 data bits, as shown in Figure 13, where:

1. Start bit: Represented as "0.5mS high level" + "15.5mS low level";
2. Data "1": Represented by "1.5mS high level" + "0.5mS low level";
3. Data "0": Represented by "0.5mS high level" + "1.5mS low level";

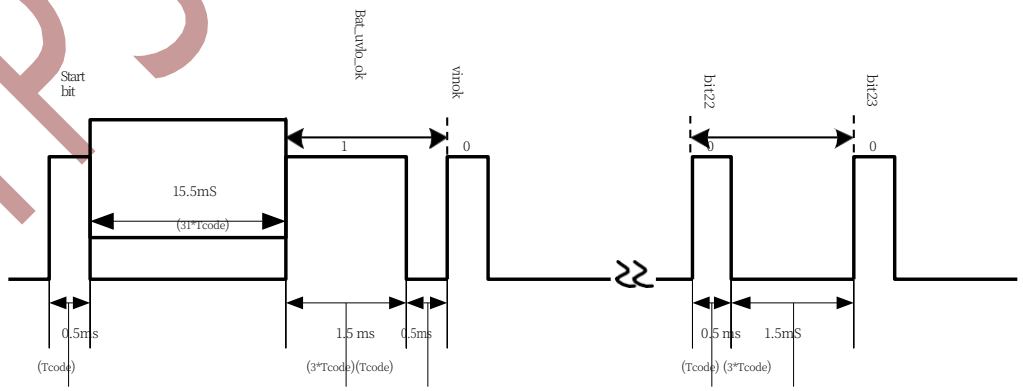

Fig. 13. Status Code Output Diagram

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The chip status code is output via push-pull configuration, with a high level indicating the selected high voltage from VIN&BAT and a low level indicating GND.

The "Status Code" has two transmission modes:

(1) Scheduled Transmission: Under normal conditions, transmitted once every 1 second, totaling 24 bits of data. After VOL/VOR enters "Light Load Shutdown," scheduled transmission is disabled to allow the IC to enter sleep mode and conserve power.

(2) Immediate transmission upon event: When an "event" occurs, a "status code" is transmitted immediately, but the minimum interval between two transmissions is approximately 8ms. "Events" are defined as shown in the table below.

Table 3. "Event" Table

No.	Signal	Description
0	EN_rp	EN Signal Rising Edge
1	Loadin_l	Load In
2	Loadin_r	Load placement
3	Iload_rp	Load greater than 10mA
4	Vinok_rp	Insert VIN
5	Vinh_fp	Remove VIN
6	Abnormal_rp	Chip Overcurrent Abnormality

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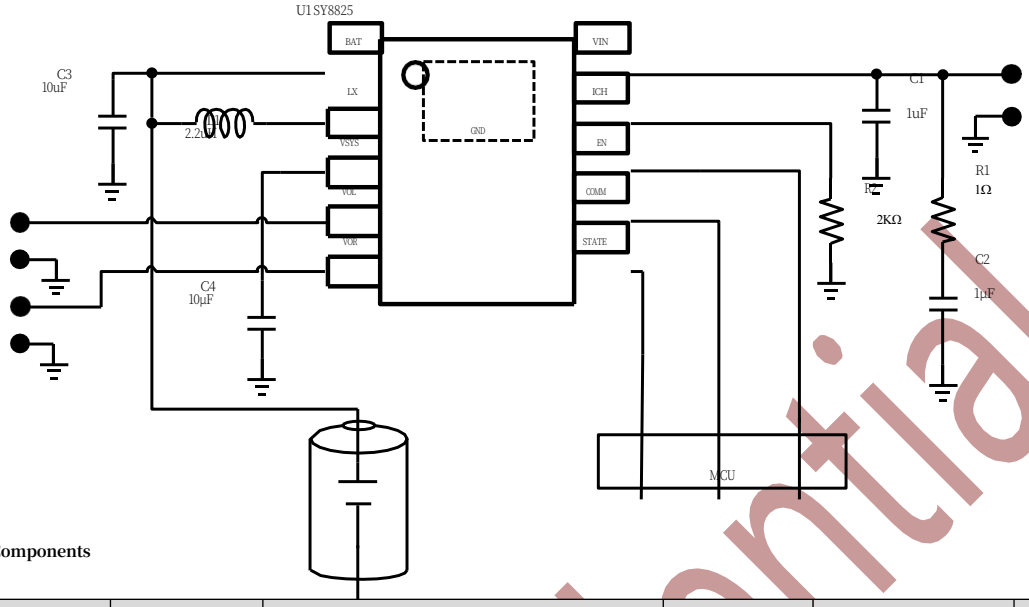
Application Schematic Diagram



Typical Circuit Components

Device	Device Type	Device Description	Manufacturer	Parameters	Quantity
C1, C2	Surface Mount Capacitor	CAP/0603/1uF/X5R/10%/25V	Samsung or equivalent	1uF/25V	2
C3, C4	Surface Mount Capacitor	CAP/0805/10uF/X5R/10%/10V	Samsung or equivalent	10uF/10V	2
R1	SMD Resistor	RES/0603/1R/5%	Yageo or equivalent	1Ω	1
R2	Surface Mount Resistor	RES/0603/2K/1%	Yageo or equivalent	2KΩ	1
L1	Surface Mount Inductor	0420 package, inductance 2.2uH, accuracy: ± 20%, rated saturation current requirement: >2A	-	2.2uH	1
U1	IC	ESSOP10	Siyuan Semiconductor	SY8825	1

PCB LAYOUT Notes

1. Place C3 as close as possible to the BAT pin, and C1 as close as possible to the VIN pin. R1 and C2 must be retained, and their traces must pass through the capacitor before connecting to the IC pins.
2. High-frequency oscillations exist between the L1 and LX pins of the inductor. These pins must be placed close together and their routing area minimized. Other sensitive components must be kept away from the inductor to reduce coupling effects.
3. Magnetic components (such as magnets) should be placed away from inductors to prevent electromagnetic interference from affecting chip operation.
4. Via holes introduce high impedance in the trace path. If high current flows through a via in the design, it is recommended to use multiple vias to reduce impedance.
5. The chip's GND should connect directly to the system ground. The copper trace for this connection should be short, wide, and maintained as continuous as possible, avoiding interruption by other traces.
6. Maximize the copper area on the PCB ground plane to facilitate heat dissipation. Ensure good contact between the chip's bottom heat sink pad and the ground plane copper to guarantee effective heat dissipation.
7. Capacitors used in the application must be X5R or higher grade.

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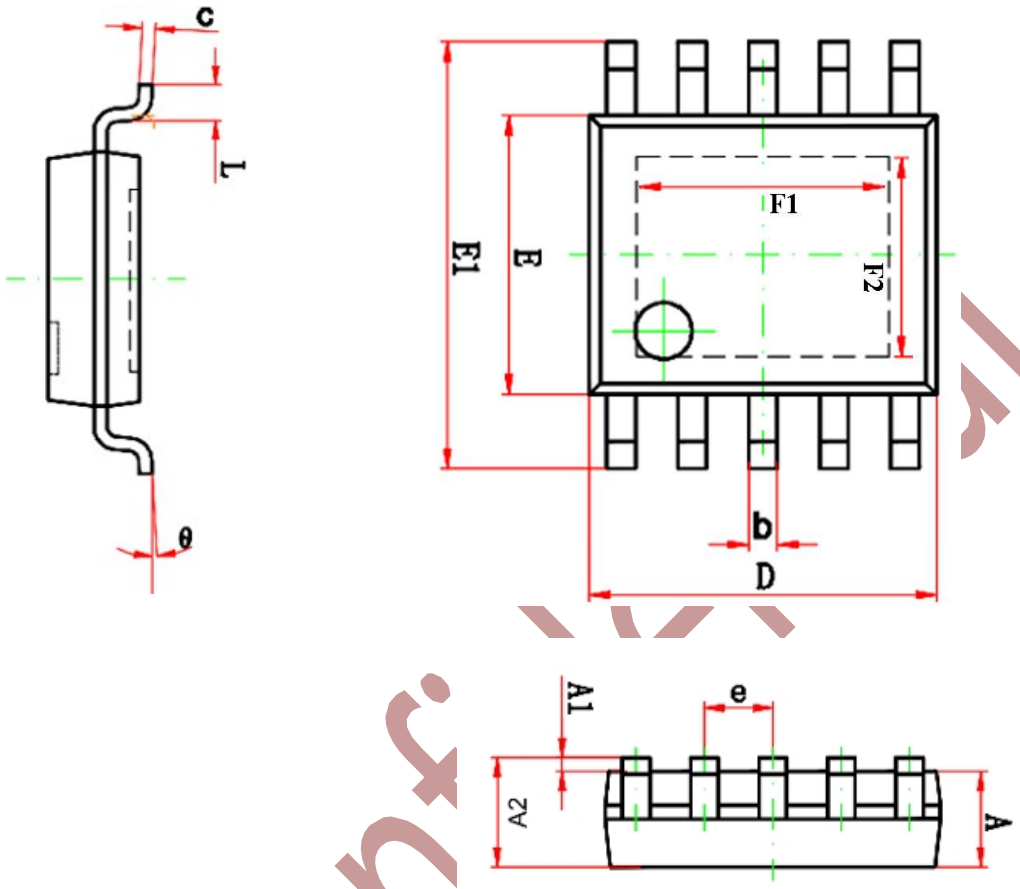
ESSOP10 Package Appearance Diagram



Measurement unit: mm			
Symbol	Minimum	Typical Value	Maximum
A	1.350	1.450	1.550
A1	0.0	0.04	0.08
A2	1.350	1.490	1.630
b	0.325	0.350	0.375
c	0.180	0.230	0.250
D	4.700	4.900	5.100
E	3.800	3.900	4.000
E1	5.800	6.000	6.200
e	1.000 (BSC)		
F1	— —	3.1	— —
F2	— —	2.2	— —
L	0.400	0.600	0.800
θ	0 °	——	8 °

All specifications and applications shown above are subject to change without prior notice. (The above circuits and specifications are for reference only. The company reserves the right to make modifications without prior notice.)

Version History

Version	Date	Description
Rev1.0	June 11, 2020	Initial Release
Rev1.1	October 20, 2020	Corrected certain functional descriptions
Rev1.2	June 4, 2021	Optimized PCB layout considerations
Rev1.3	August 13, 2021	Adjusted Product Procurement Part Numbers
Rev1.4	October 13, 2021	Enhanced LED-related parameter information

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